

Having described the invention, the following is claimed:

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C17* 1. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device having a stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward direction away from the vehicle roof, a first portion of said inflatable vehicle occupant protection device being adapted to engage an occupant's head positioned against the side structure of the vehicle, said first portion

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moving the occupant's head laterally in the vehicle and away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

2. Apparatus as recited in claim 1, wherein said inflatable vehicle occupant protection device comprises overlying panels interconnected to form a perimeter connection extending along a perimeter of said inflatable vehicle occupant protection device, said inflatable vehicle occupant protection device including at least one connection interconnecting said overlying panels within said perimeter to help define a plurality of inflatable chambers of said inflatable vehicle occupant protection device, said inflatable chambers including a forwardmost chamber positioned forward of all remaining inflatable chambers, at least a portion of said forwardmost chamber being initially deployed adjacent the vehicle side structure forward of the occupant's head and vertically below the top of the occupant's head, said first portion of said inflatable vehicle occupant protection device inflating rearward of said at least a portion of said forwardmost chamber to move the occupant's head laterally

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in the vehicle away from the vehicle side structure, said first portion inflating between the side structure of the vehicle and the occupant's head.

3. Apparatus as recited in claim 2, wherein said at least one connection helps direct inflation fluid into said forwardmost chamber to help initially deploy said at least a portion of said forwardmost chamber adjacent the vehicle side structure forward of the occupant's head and vertically below the top of the occupant's head.

4. Apparatus as recited in claim 1, wherein said inflatable vehicle occupant protection device is adapted to inflate and unroll in a downward direction away from the vehicle roof and in an outboard direction towards the vehicle side structure.

5. Apparatus as recited in claim 1, wherein the occupant's head is positioned against a side window of the vehicle side structure prior to inflation of said inflatable vehicle occupant protection device.

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6. Apparatus as recited in claim 1, wherein said occupant is a front seat occupant of the vehicle.

7. Apparatus as recited in claim 2, wherein said first portion is forced between the occupant's head and the vehicle side structure at least partially by inflation of said forwardmost chamber.

8. Apparatus as recited in claim 2, wherein said first portion is inflated at least partially by inflation fluid directed rearward from said forwardmost chamber into said first portion.

9. Apparatus as recited in claim 2, wherein said inflatable vehicle occupant protection device further includes an inflatable rearwardmost chamber positioned rearward of all other inflatable chambers, a second portion of said inflatable vehicle occupant protection device positioned forward of said rearwardmost chamber when inflated being adapted to engage a rear seat occupant's head positioned against the side structure of the vehicle, at least a portion of said rearwardmost chamber being initially deployed adjacent the vehicle

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side structure rearward of the rear seat occupant's head and vertically below the top of the rear seat occupant's head, said second portion inflating forward of said at least a portion of said rearwardmost chamber to move the rear seat occupant's head away from the vehicle side structure, said second portion inflating between the side structure of the vehicle and the rear seat occupant's head.

10. Apparatus as recited in claim 9, wherein the rear seat occupant's head is positioned against a side window of the vehicle side structure prior to inflation of said inflatable vehicle occupant protection device.

11. Apparatus as recited in claim 9, wherein said second portion is forced between the occupant's head and the vehicle side structure at least partially by inflation of said rearwardmost chamber.

12. Apparatus as recited in claim 9, wherein said second portion is inflated at least partially by inflation fluid directed forward from said rearwardmost chamber into said first portion.

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13. Apparatus as recited in claim 2, wherein said perimeter is at least partially defined by upper and lower edges of said inflatable vehicle occupant protection device and front and rear portions spaced apart along said upper and lower edges, said front chamber being positioned at least partially in said front portion, said rear chamber being positioned at least partially in said rear portion.

14. Apparatus as recited in claim 13, wherein said front chamber defines said front portion and said rear chamber defines said rear portion, said inflatable vehicle occupant protection device further comprising a middle portion extending between said front and rear portions, said inflation fluid being directed from said front and rear portions into said middle portion when said inflatable vehicle occupant protection device is inflated.

15. Apparatus as recited in claim 1, wherein said inflatable vehicle occupant protection device when rolled up in said outboard direction towards the vehicle side

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structure is rolled up about an axis extending generally parallel to the length of said inflatable vehicle occupant protection device.

16. Apparatus as recited in claim 1, further comprising a housing for storing said inflatable vehicle occupant protection device in said stored position, said inflatable vehicle occupant protection device and said housing having a generally elongated configuration extending along the side structure of the vehicle near the intersection of the side structure and the vehicle roof when said inflatable vehicle occupant protection device is in said stored position.

17. Apparatus as recited in claim 1, further comprising a fill tube for directing said inflation fluid into said inflatable vehicle occupant protection device to inflate said inflatable vehicle occupant protection device.

18. Apparatus as defined in claim 1, wherein said inflatable vehicle occupant protection device is an inflatable curtain.

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19. Apparatus as defined in claim 1, wherein said inflation fluid source comprises a stored gas inflator.

20. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including an inflatable first portion and an inflatable second portion, said first portion being the forwardmost positioned inflatable portion of said inflatable vehicle occupant protection device, said inflatable vehicle occupant protection device having a stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said

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inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward direction away from the vehicle roof and in an outboard direction towards the vehicle side structure, said second portion when inflated being adapted to engage initially an occupant's head positioned against the side structure of the vehicle, said first portion being initially deployed adjacent the vehicle side structure forward of and vertically below the top of the occupant's head, said second portion upon continued inflation unrolling in said outboard direction and said downward direction, said second portion moving the occupant's head away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

21. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said

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inflatable vehicle occupant protection device including an inflatable first portion and an inflatable second portion, said first portion being the rearwardmost positioned inflatable portion of said inflatable vehicle occupant protection device, said inflatable vehicle occupant protection device having a stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward direction away from the vehicle roof and in an outboard direction towards the vehicle side structure, said second portion when inflated being adapted to engage initially an occupant's head positioned against the side structure of the vehicle, said first portion being initially deployed adjacent the vehicle side structure rearward of and vertically below the top of the occupant's head, said

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second portion upon continued inflation unrolling in said outboard direction and said downward direction, said second portion moving the occupant's head away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

22. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including an inflatable first portion and an inflatable second portion, said first portion being the rearwardmost positioned inflatable portion of said inflatable vehicle occupant protection device during a substantial portion of initial inflation of said inflatable vehicle occupant protection device, said inflatable vehicle occupant protection device having a stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

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an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward direction away from the vehicle roof and in an outboard direction towards the vehicle side structure, said second portion when inflated being adapted to engage initially an occupant's head positioned against the side structure of the vehicle, said first portion being initially deployed adjacent the vehicle side structure rearward of and vertically below the top of the occupant's head, said second portion upon continued inflation unrolling in said outboard direction and said downward direction, said second portion moving the occupant's head away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

23. Apparatus as recited in claim 22, further comprising an inflatable fold-out portion inflatable into a position rearward of said rearwardmost portion after

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said inflatable vehicle occupant protection device is substantially inflated.

24. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including an inflatable front chamber and at least one inflatable chamber positioned rearward of said front chamber, said inflatable vehicle occupant protection device having a stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward

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direction away from the vehicle roof, said at least one chamber when inflated being adapted to engage initially an occupant's head positioned against the side structure of the vehicle, said front chamber being initially deployed adjacent the vehicle side structure forward of and vertically below the top of the occupant's head, said inflatable vehicle occupant protection device upon continued inflation inflating rearwardly from said front chamber to inflate said at least one chamber, said at least one chamber moving the occupant's head away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

25. Apparatus for helping to protect an occupant of a vehicle that has a side structure and a roof, said apparatus comprising:

an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including an inflatable rear chamber and at least one inflatable chamber positioned forward of said front chamber, said inflatable vehicle occupant protection device having a

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stored position in which said inflatable vehicle occupant protection device is rolled up in an outboard direction towards the vehicle side structure; and

an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

said inflatable vehicle occupant protection device being adapted to inflate and unroll in a downward direction away from the vehicle roof, said at least one chamber when inflated being adapted to engage initially an occupant's head positioned against the side structure of the vehicle, said rear chamber being initially deployed adjacent the vehicle side structure rearward of and vertically below the top of the occupant's head, said inflatable vehicle occupant protection device upon continued inflation inflating forward from said rear chamber to inflate said at least one chamber, said at least one chamber moving the occupant's head away from the vehicle side structure and inflating between the side structure of the vehicle and the occupant's head.

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26. A method for helping to protect an occupant of a vehicle that has a side structure and a roof, wherein a head of the occupant is positioned against the vehicle side structure, said method comprising the steps of:

providing an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including inflatable first and second portions, said first portion being the forwardmost positioned inflatable portion of said inflatable vehicle occupant protection device;

providing an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

rolling up said inflatable vehicle occupant protection device in an outboard direction towards the vehicle side structure and into a stored position;

adapting said inflatable vehicle occupant protection device to inflate and unroll in a downward direction away from the vehicle roof;

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adapting said second portion to engage initially the occupant's head positioned against the side structure of the vehicle;

directing inflation fluid into said first portion to help initially deploy said first portion forward of and vertically below the top of the occupant's head and adjacent the vehicle side structure before said second portion is deployed vertically below the top of the occupant's head; and

adapting said second portion to move the occupant's head away from the vehicle side structure and inflate between the vehicle side structure and the occupant's head.

27. A method for helping to protect an occupant of a vehicle that has a side structure and a roof, wherein a head of the occupant is positioned against the vehicle side structure, said method comprising the steps of:

providing an inflatable vehicle occupant protection device inflatable into a position between the side structure of the vehicle and a vehicle occupant, said inflatable vehicle occupant protection device including inflatable first and second portions, said

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first portion being the rearwardmost positioned inflatable portion of said inflatable vehicle occupant protection device;

providing an inflation fluid source that provides inflation fluid for inflating said inflatable vehicle occupant protection device and maintaining said inflatable vehicle occupant protection device in an inflated condition for at least five seconds;

rolling up said inflatable vehicle occupant protection device in an outboard direction towards the vehicle side structure and into a stored position;

adapting said inflatable vehicle occupant protection device to inflate and unroll in a downward direction away from the vehicle roof;

adapting said second portion to engage initially the occupant's head positioned against the side structure of the vehicle;

directing inflation fluid into said first portion to help initially deploy said first portion rearward of and vertically below the top of the occupant's head and adjacent the vehicle side structure before said second portion is deployed vertically below the top of the occupant's head; and

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adapting said second portion to move the occupant's head away from the vehicle side structure and inflate between the vehicle side structure and the occupant's head.

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